

Report on the participation in IEEE EMC Symposium 2007 Hawaii

Steering Committee, Technical Subcommittee, International Relations Subcommittee and Communication Subcommittee

IEEE EMC Symposium this year was convened in Hawaii in commemoration of its 50th anniversary. We participated in the symposium to increase the visibility of VCCI in workshops, special sessions and exhibition in the environment in which overseas membership is steadily growing and MOU between Japan and the US became effective from April 2007. In response to a request from IEEE EMC Society we arranged a special session titled “Advanced EMI Measurement” to demonstrate VCCI activities in state-of-the-art EMI measurement. Five papers were presented from VCCI in this session. Also a representative of the VCCI International Relations Subcommittee made a presentation on EMC regulations in Japan in the workshop titled “Managing Regulatory Access to Asia Pacific” designed to discuss regulatory situations in major countries of Asia Pacific.

In parallel with the symposium there was an EMC related exhibition run with participation of 108 companies, one of which was VCCI. In the VCCI booth representatives of VCCI Communications Subcommittee were engaged in electromagnetic field simulation, projection of VCCI video and circulation of fliers and other materials.

1. The gist of the symposium

(1) Period: July 8 - 12, 2007

July 8 and 12 : workshops and tutorials, technical sessions, special sessions and poster sessions

July 10 - 12 : exhibitions

(2) Venue: Hawaiian Convention Center, Honolulu, Hawaii

(3) Workshops and technical sessions

Workshops and tutorials: 20 workshops

Technical session: 30 sessions

Special sessions: 9 sessions

Presented papers: 148 papers in technical sessions

55 papers in special sessions

32 papers in poster sessions

(4) The number of participants: roughly 1,500 people (400 for technical sessions and 1,100 for exhibitions)

What follows is summary of sessions VCCI was involved in.

2. Special session “Advanced EMI Measurement”

This session hosted and moderated by VCCI was conducted in the last day of technical programs. Five presenters of VCCI talked about leading edge measurement methods and state-of-the-art site validation methods and the like to contribute to the advancement of EMC engineering.

(1) Date/time: July 12, 2007, 14:45 - 17:30hr

(2) Venue: Hawaii Convention Center

(3) Participants

Chairman: Yamane project leader Co-chairman: Mr. Bob Hofmann

Presenters: Mr. Chiharu Miyazaki (VCCI Technical Subcommittee, Mitsubish Elec)

Mr. Kaoru Gotoh (NICT)

Mr. Satoshi Kazama (Taiyo Yuden)

Mr. Atsushi Nakamura (Renesas)

Mr. Kunihiro Osabe (VLAC)

(4) Presentation content

“Theme: Advanced EMI Measurement (SS8)”

Investigation of Radiated Emission Measurement Method above 1 GHz : Chiharu Miyazaki

This paper discusses differences in measurement results attributable to VBW settings in network analyzer in EMI measurement above 1GHz proposed in CISPR22 edition 5.2

Development and evaluation of a prototype multi-channel APD measuring receiver : Kaoru Gotoh

This paper discusses APD (Amplitude Probability Distribution) scheme applied to BER evaluation of digital communication system. 5-channel wireless LAN system was used for proving effectiveness of the method.

Adjacent Electromagnetic Field APD Measurement for Analyzing Auto-jamming Issue on Wireless Communication System : Satoshi Kazama

APD is one of the methods to know the distribution of adjacent electromagnetic field generated from such a device as printed circuit board. This method, however, causes a problem known as auto-jamming over digital wireless communication system. This paper discusses analysis of this problem.

Common Mode Voltage Evaluation for Choosing Quiet MCU and Optimizing PCB Design : Atsushi Nakamura

Work Bench Faraday Cage method is proposed to reduce noises from PCB and MCU (microcomputer). This paper discusses actual evaluation of MCU with this method. In concrete terms, this method was applied to measurement of PCB voltage fluctuations caused by MCU operation in the process to reduce common mode current in wire harness

Inter-laboratory Comparison Result as the Proficiency Testing Program of EMI Test Sites in Japan : Kunihiro Osabe.

This paper introduces inter-laboratory comparison to evaluate technical proficiency of laboratories which

was actually conducted with multiple laboratories in Japan. A custom-made comb generator used for this evaluation was designed to work with AC power. Dispersion of measurement data at each site was within 6 -10 dB at almost all frequency.

(5) Remarks

Approximately 60 people attended the session in spite that it was programmed as the last item of technical sessions. This fact implies that state-of-the-art technology of Japan and its direction in the field of EMC is paid close attention to.



A scene of presentation



Audience of the session

3. Workshop “Managing Regulatory Access to Asia Pacific”

This was a workshop to introduce regulatory situations in major Asia Pacific countries. Chinese situation drew much attention but it seemed details are still to be defined. Applause broke out when MOU between Japan and the US was introduced as becoming effective from April 2007 to simplify conformity assessment procedure,. This fact implies that VCCI members in the US evaluate the MOU more favorably than we think.

(1) Date/time: July 8 2007, 08:30 - 16:30hr

(2) Venue: Room 316, Hawaii Convention Center

(3) Presenter: Mr. Satoshi Shibata, VCCI International Relations Subcommittee

The number of attendees: approximately 40

(4) Summary of the workshop

Opening remarks: Mr. Kwok Soohoo/IBM

Introduced day’s program. Korean attendance cancelled.

Market access by means of inter-governmental MRA: Ms. Mary Jo Dibernardo/NIST

- Introduction of NIST: An organization established in 1901 under Department of Commerce responsible for measurement, standards, promotion of science and engineering, and innovation and competitiveness of US industry.
- Purpose of MRA: Earlier market access and reduction of cost by mutual acceptance of conformity

assessment results

- Roles of government agencies in MRA
 - FCC: Regulatory agency
 - NIST: Designates CABs (conformity assessment bodies)
 - NVLAP, A2LA, ANSI: Accreditation bodies to accredit CABs
 - CAB: Carries out product testing and issues certificate
- MRAs in which US is a party:
 - EU/EEA/EFTA (bilateral, multi-sectors)
 - APEC (multilateral, single sector)
 - CITEL (multilateral, single sector)
 - Japan (bilateral, single sector)
- The number of CABs designated by US
 - 44 in EU EMC field and 26 in communication field etc.

Product certification programs of FCC: Mr. William Hurst/FCC

- FCC's responsibility: As an independent administrative organization responsible to the US congress FCC regulates all types of communications including radio, wired, TV broadcasting, satellite communications and cable communications.
 - FCC rules: CFR47 has 101 Parts. Part15 concerns EMC. Sub-part B deals with unintentional radiation and sub-part C deals with intentional radiation. Part18 concerns ISM equipment. Part68 concerns communication equipment.
 - Types of product certifications: Verification, SDoC, DoC and Certification
 - Accreditation of laboratories: Overseas laboratory is accredited by either of the following ways
 - A) FCC recognizes the lab which was accredited by the authority of counterpart government based on MRA
 - B) Accredited by an accreditation body designated by FCC
 - C) Accredited by TCB (increasing year by year. 8,000 cases certified by TCB: vs. 500 cases by FCC in 2006)
- Note: * 4 MRAs of which FCC is a party: MRAs with EU, APEC, CITEL and Japan
- * Countries under MRA phase I: Australia, Canada, Taiwan, EU, Hong Kong, Japan, Korea and Singapore
 - * Countries under MRA phase II: Canada, EU and Singapore
- D) Challenges in conformity assessment: publication in Website of rules and their interpretation, evaluation of TCB proficiency and improvement of designation process, coping with multi-function equipment, keeping pace with technological advancement, etc.

CCC certification of China and RoHS: Mr. Wei Chen/CQC

- Overview of CQC: Certification body accredited by the government. An NCB in IECEE-CB system.
- CCC certification: 159 items of 22 types are subject to compulsory CCC certification. 258,000

certificates in total were issued by May 2007. CB system is applicable only to product safety. Testing is required for EMC. Other things explained include requirement for CCC mark, initial and follow-up factory inspections and market sampling test.

- RoHS regulation of China
 - A) Reinforces China domestic system to cope with IEC/TC111
 - B) Related laws: Environment protection law, Clean production promotion law, Solid waste environment contamination prevention law and Electronic and information equipment contamination control ordinance.
 - C) Labeling of a slip required on ITE to indicate usable duration without impacting environment
 - D) CCC certification is mandatory on designated items
 - E) The regulation is enforced from March 1, 2007 except for application of articles on designated items
 - F) Indication is needed about standards applied, inclusion or exclusion of toxic materials etc.

Status on EMC testing in China: Professor Guili He and Mr. Dongyi Zou/CTTL

- Overview of China Telecommunication Technology Laboratory (CTTL)
 - A) Is a laboratory under CATR/MII
 - B) 298 employees belong to four sites. Engaged in the research of advanced information communication network and standards in the field of information communication. Main mission is to function as third party testing laboratory.
 - C) Provides testing services for FCC certification and CE marking on top of CCC certification and network entry permits
- EMC testing and certification
 - A) EMC standards for communication equipment are harmonized with corresponding standards of CISPR, IEC, ITU-T SG5 (e.g. YD/T968 is the same as CISPR22/24)
 - B) Types of standards: National standards (GB), Communication industry standard (YD: published by MII), MII technical requirements (YDN) and international standards adopted as they are.
 - C) Only communication terminals are subject to testing (EMC and product safety) in CCC certification
 - D) Difference between EMC network entry permits and CCC certification:
 - For wired terminals – emission only in CCC but immunity required too in EMC network entry permits
 - For wireless terminals – same standards apply in both cases
 - E) Network entry permit is issued by MII. CCC certificate is issued by CNCA. Efforts are being made to avoid duplication of testing.

EMC regulation in Japan and voluntary control by VCCI: Mr. Satoshi Shibata/VCCI

- Introduced the following.
 - A) A summary of Japanese EMC regulations

- B) Electric appliances and material safety law
- C) Radio law
- D) Telecommunication business law
- E) VCCI
- F) Industry guidelines

Canadian requirements for telecommunication equipment and status on MRA implementation: Mr. Andrew Kwan/IC

- Standards applied: SC-3 for terminals, RSS for radio equipment and ICES for EMC
- Conformity assessment procedure
 - A) Terminals: testing by IC accredited laboratory (utilize MRA for overseas applications)
Radio equipment: test report issued by any laboratory is accepted. Need registration to IC for OATS.
 - B) EMC: test report issued by any laboratory is accepted. Applicant is required to retain the test report for the period of five years.
 - C) Radio equipment certification: Applicants file applications together with test report to IC or accredited CB. As to overseas CB, IC accredits it based on MRA. CB is held responsible for audit of certified products.
- Indication of certification: T: XXXXXX-YYYYYYYYY (R in place of T for radio equipment)
- Market control: random sampling test and grievance-based test by IC, import monitor, publication of certified equipment list etc.
- MRAs in which Canada is party:
 - APEC (telecommunication), Inter-America, EU (telecommunication and EMC), Switzerland and EFTA (telecommunication and EMC)
 - EMC in Taiwan: Mr. Yung-Chi Tang/BSMI
- NCC (equivalent to US FCC) certifies telecommunication, radio/TV broadcasting and radio equipment
- BSMI certifies ITE, AV equipment, electrical appliances, etc.
- Certification system of BSMI: batch inspection, monitor-base inspection, product certification and registration (RPC), DOC, voluntary product certification (VPC)
- CNS13438: 95 (CISPR22: 2005 + A1) is required from July 1, 2007. However, telecommunication ports EMI measurement and EMI measurement above 1GHz are pending.
- Regulation on digital television: PRC or type approval is needed for 29-inch + TV from January 1, 2006, 21-29-inch TV from July 1, 2007 and smaller TV than 21-inch form January 1, 2008.
Product certification in Hong Kong and implementation of phase I/II MRA: Mr. W. K. Luke/OFTA
- Product certification system (HKTEC)
 - A) Types of certification: Compulsory certification (CCS: radio communication in general) and voluntary certification (VCS: wired terminals and low output radio equipment such as WLAN)
 - B) Test is to be done by accredited laboratories (HKAS accredited laboratories or laboratories

accredited by accreditation body recognized by HKAS via MRA)

C) Marking on the product is left to the owner (requirement is HKTA3211)

D) Applied standards are HKTA standards. Additionally conformance to Telecommunication Order 205 is required for EMC, which is amendment of telecommunication apparatus exemption from licensing.

E) ITE is required to conform to Telecommunication Regulations of Part II of Schedule 1 to Chapter 106B

- MRA phase I: laboratories of Hong Kong are accredited in the US, Canada and Singapore. On the other hand laboratories of the US, Canada and Singapore are accredited through OFTA.
- MRA phase II: MRA with the US is already in phase II. If overseas accreditation body accredited a laboratory, surveillance following accreditation will be conducted by the overseas laboratory.



A scene of workshop

4. Report on exhibition

As many as 108 companies ran their booth on EMC related gears and services in the exhibition hall on the first floor of the convention center where the symposium was held in parallel. There was a special booth of IEEE to exhibit historical events in the past 50 years since its establishment. It was felt that exhibit visitors were smaller in number compared to past exhibitions especially while technical sessions and workshops were conducted in the symposium. We ran our exhibition with movable VCCI booth as usual. We were engaged basically in explanation of VCCI, display of information on VCCI with CD-ROM and demonstration of electromagnetic simulations with CD-ROM.

(1) Date of exhibition: July 10 - 12, 2007

(2) Venue: Exhibition Hall of Hawaii Convention Center

(3) VCCI attendants: Mr. Tada (member of the Communication Subcommittee), Mr. Yamada, Ms. Hori, Mr. Kawano and Ms. Inagaki (secretariat of the subcommittee)

(4) Summary

Booth visitors: Approximately 400

Materials circulated

300 packages in a novelty bag that contains application guide, annual report, VCCI EMC standards list, VCCI brochure, English version of CD-ROMs, VCCI calendar (with artwork based on copy of the design of illuminated advertisement board posted at JR Shinjuku and Akihabara stations)

Major questions asked at the booth

- About principle of kit module measurement – what to measure and why
- About electromagnetic simulations with CD-ROM
- About MOU - what about accredited sites in Canada and Taiwan etc. (answer – at this moment only sites in the US are subject of the MOU)

Identified five prospect members, one of which actually sent us application form after we returned home.

(5) Remarks

- Most of the visitors to VCCI booth had basic knowledge about VCCI. As such questions asked were of professional nature.
- One non-member testing site operator had intention to register his measuring facilities
- Some visitors showed much interest in how to get electromagnetic simulations with CD-ROM. Also some showed interest in VCCI training course using the simulation.



VCCI exhibition booth area

5. Overview of presentations of interest

What follows is presentations in workshops, technical sessions, special sessions and open forum which are worth reporting as they concern VCCI.

(1) Workshop and tutorials

The workshop conducted for two days from July 8 consisted of 20 sessions covering wide range of EMC topics of the convener's choice including the following. Conducted and radiated EMI measurement using probes and antennas, a model of lighting surges and protection techniques from lighting, elements of wireless

communications (mobile phones and others), nano-technology and next generation materials, future technology in Pan Pacific. One subject in the workshop which was of particular interest to VCCI was “Advances in Site Validation Technique and Related Activity Above 1GHz.”

(2) Technical sessions

148 papers in total were presented in 20 sessions in three days from July 10. Since a part of the last day was reserved for the 50th anniversary of IEEE in the exhibition, the number of papers on the last day was smaller than usual to our regret. However, content was as good as usual due seemingly to competence of referees. Theme selection policy was agreeable because papers presented on 24 themes covered EMC activities around the world as follows.

EM Modeling : 11 papers, (2) EM Environment : 4 papers, (3) Biological Effect : 3 papers, (4) Signal Integrity : 18 papers (5) TEM Cell Measurement : 4 papers, (6) SAR Measurement : 4 papers, (7) Electromagnetic Bandgap Structures : 4 papers, (8) EMC Measurement : 7 papers, (9) Automotive EMC Modeling : 4 papers,(10)Product Safety Testing : 4 papers,(11)Automotive EMC Measurements : 4 papers, (12) Computational Electromagnetic Modeling : 17 papers, (13) System Level EMC : 6 papers, (14) Transient Immunity : 7 papers, (15) Shielding : 6 papers, (16) Integrated Circuit EMC : 6 papers, (17) EMC Test Facilities and Antennas : 5 papers, (18) PCB EMC : 9 papers, (19) Shielding Performance Modeling : 6 papers,(20)EM Materials : 6 papers,(21) Reverberation Chamber Measurements : 11 papers, (22)PCB Modeling : 6 papers,(23)Cables and Transmission Lines : 2 papers,(24)High-Voltage : 3 papers

Analysis of themes of those papers results in the following ranking order in the number of papers.

Top group is about modeling of electromagnetic field by computer: 11 papers on EM modeling and 17 papers on computational electromagnetic modeling to make 28 papers in total. 2nd in the ranking: 18 papers is signal integrity. 3rd in the ranking: 15 papers in total in the area of measurement technology comprising 5 papers on EMC test facilities and antennas and 7 papers on EMC measurement plus print circuit board related EMC and modeling techniques. Other topics: 11 papers in total on EMC of vehicle mounted equipment and measuring techniques, electromagnetic environment, shielding techniques and measurement with reverberation chambers. Papers on base EMC technology such as TEM Cell, SAR and EMC were also presented.

The following observation was made by Mr. Atsuya Maeda who was co-chairman for the session(17)EMC Test Facilities and Antennas which is deeply associated with VCCI.

Among presentations on validation of measurement site and antenna factors many were about those employing Time Domain scheme. In this scheme in which measurement is done in conversion of frequency axis to time axis the limit in the window of the frequency affects converted output. I (Maeda) captured this fact when I was measuring antenna characteristics with a then state-of-the-art network analyzer (covering 20GHz if I remember correctly). Therefore it is necessary to thoroughly validate whether or no obtained result is accurate. It is a pity that papers presented at this time lack this validation process by blindly accepting measurement results. Authors of those papers discussing analysis of measurement by Time Domain scheme appear to be keeping up with a trend, but they should know there is a risk involved in blindly believing the result of measuring instruments in “black

box,” if I am not too cautious,

I am pleased that [Dennis Camell (NIST) et al.: Free Space Antenna Factor through the use of Time-Domain Signal Processing] presented in my session was selected as the best paper of the symposium.

(3) Special sessions

55 papers in 8 themes as follows were presented in the special sessions conducted in parallel with the technical sessions in 3 days from July 10. They are, (1) Wave diversity, (2) Automotive EMC Design and Integration, (3) EMC History, (4) Power Integrity/Signal Integrity for Next Generation Systems, (5) Emerging EMC Technologies in Japan, (6) Algorithm and Techniques for Parallel Processing for EMI/EMC, (7) Electronic Packaging EMC And Signal Integrity and (8) Advanced EMI Measurements

What follows is an overview of them except for (8) Advanced EMI Measurements which was reviewed earlier in this report.

(3) EMC History was apparently programmed to commemorate the 50th anniversary of the symposium, which was timely and appropriate. From session titles it can be said that many papers discuss EMC technology of the next generation as represented by sessions (4) and (5). It should be noted that EMC of vehicle mounted equipment which is a hot topic in Japan is also discussed in IEEE here. Papers in session (6) discussing computer simulations for EMC optimization in equipment design were interesting from standpoint of application of simulation.

(4) Poster sessions

32 papers in 4 themes as follows were presented in the poster sessions conducted in parallel with the technical session in 3 days from July 10. (1) EMC technology at PCB and IC levels, (2) Power Line Communication, Safety and EMC of living organism, (3) EMC at the system level, and (4) Electromagnetic field measurement technology.

TU-PM-PS-4“Degree of Unbalance about Earth and Radiated Emission of Differential Type Microstrip Line in GHz Band”in session (1) presented by Tokuda laboratory of the Musashi Institute of Technology discusses the analysis of effects to radiated EMI caused by imbalance in grounding at 1-6GHz band. This was an interesting paper as reference. Only 2 papers were presented in Session (2) by the same laboratory seemingly because PLC is under development in CISPR. Comparatively large number of papers in sessions (3) and (4) discuss measurement of shielding effects and shielding technologies.

6. Summary

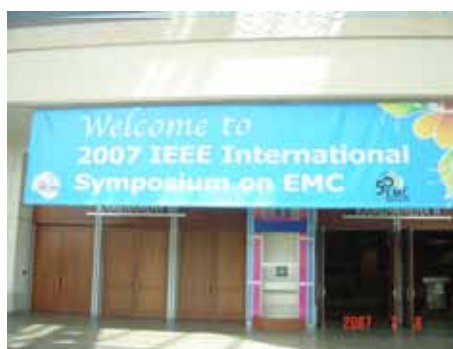
VCCI participation in IEEE EMC Symposium commemorating its 50th anniversary was very meaningful in the circumstances that the MOU between Japan and US was just implemented, VCCI is accumulating its experience in the area of EMI measurement above 1GHz and PCB level EMI measurement, and starting studies in emerging EMC technology for digital era. It was a good opportunity for us to demonstrate VCCI competence in prove-through-experiments activities and skills in state-of-the-art EMC technology in this symposium attended by

more than 100 EMC engineers. We would like to express our gratitude for Mr. Bob Hofmann for his great support to us holding the special session and for his service as the chairman of the session. It is good for EMC community that the symposium apparently has made a lot of efforts in the last few years in creating a better environment for participants from overseas, which is considered proven by the increased number of participants. It should be noted that international standards and EMC situations in Asia Pacific drew attention of a lot of people in workshops. It was encouraging to know that a lot of papers were about EMI measurement technology using receiving antenna which VCCI is good at. At the same time we were able to confirm that direction we are taking is right in such areas as EMI measurement above 1GHz, site validation schemes and techniques to measure and evaluate excessive electromagnetic emissions from ITE.

Taking a look at the number of papers by country, Japan is next to the top US, which proves that Japanese EMC skill is high. One reason we think our participation in the symposium was particularly meaningful is that there were quite a few papers referring to VCCI compared to those presented at Chicago symposium 2 years ago. Since this symposium is the most authoritative symposium attracting topnotch EMC engineers in the world, it is the best opportunity not only for VCCI Technical Subcommittee but also for International Relations Subcommittee and Communications Subcommittee to do outreach activities in the symposium to increase the visibility of VCCI in the industry. We should continue our participation in the future.

Reference information: The number of papers presented at technical sessions by country

Year Venue	US	Italy	Japan	Germany	UK	France	Korea	Canada
2001 Montreal	64	9	16	11	8	7	1	18
2002 Minneapolis	67	13	27	10	7	3	7	3
2003 Boston	61	19	18	9	6	5	4	4
2004 Santa Clara	68	12	7	7	6	6	9	2
2005 Chicago	40	15	12	13	4	1	1	4
2007 Honolulu	85	12	29	22	6	1	7	0



Entrance to the symposium site



Venue of the convention